

What is claimed is

1. A voltage regulator of a vehicle AC generator including a rotor having a plurality of magnetic poles, a field coil for polarizing said plurality of magnetic poles, an armature having an armature core with a plurality of phase windings for generating AC voltage under the influence of rotating magnetic field provided by said rotor and a full-wave rectifier for converting said AC voltage into DC voltage, said voltage regulator comprising:

means for detecting phase voltage of one of said phase windings, and

a comparator for comparing said phase voltage with a variable threshold level formed from said phase voltage and providing an output signal.

2. The voltage regulator of a vehicle AC generator as claimed in claim 1, further comprising a pulse detecting means for detecting the number of frequency or pulses of said output signal of said comparator, wherein

said field coil is energized to polarize said plurality of magnetic poles if the number of frequency or pulses of said input signal is the same as or larger than a predetermined level.

3. The voltage regulator of a vehicle AC generator as claimed in claim 1, wherein

said variable threshold level corresponds to one of the maximum voltage and the minimum voltage of said phase voltage.

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4. The voltage regulator of a vehicle AC generator as claimed in claim 1, wherein

 said variable threshold level corresponds to a value between the maximum voltage and the minimum voltage of said phase voltage.

5. The voltage regulator of a vehicle AC generator as claimed in claim 4, wherein

 said variable threshold level crosses said phase voltage twice in a cycle of said phase voltage when said rotor rotates.

6. The voltage regulator of a vehicle AC generator as claimed in claim 5, wherein

 said variable threshold level corresponds to a mean value of said phase voltage.

7. The voltage regulator of a vehicle AC generator as claimed in claim 1, wherein

 said frequency of said output pulse of said comparator is equal to the frequency of said phase voltage.

8. The voltage regulator as claimed in claim 1, further comprising a second comparator for comparing said phase voltage with a reference value, wherein

 said field current is supplied to said field coil for a predetermined period to increase said phase voltage when said second comparator reverses the output signal thereof.

9. The voltage regulator of a vehicle AC generator as claimed in claim 8, wherein

said phase voltage detecting means comprises a first resistor connected between the output terminal of said phase winding and the negative terminal of a vehicle battery, a series circuit of a second resistor having much lower resistance than said first resistor and a switching means connected in parallel with said first resistor, wherein

said switching means is opened if said phase voltage is detected to be higher than a predetermined voltage.

10. The voltage regulator of a vehicle AC generator as claimed in claim 9, wherein said switching means comprises a MOSFET.

11. The voltage regulator as claimed in claim 8, wherein said predetermined period is equal to or longer than a period during which said field coil is supplied with field current so that said phase voltage becomes as high as about a half of a nominal vehicle battery voltage.

12. The voltage regulator as claimed in claim 8, wherein

said field current is cut for a period that is longer than said predetermined period after said field current is supplied to said field coil for said predetermined period and before said field current is supplied to said field coil for a next

predetermined period.

13. A voltage regulator of a vehicle AC generator including a rotor having a plurality of magnetic poles and a field coil for polarizing said plurality of magnetic poles, an armature having an armature core with a plurality of phase windings for generating AC voltage under the influence of rotating magnetic field provided by said rotor and a full-wave rectifier for converting said AC voltage into DC voltage, said voltage regulator comprising:

an input terminal connected to one of said phase windings;
a sub-power circuit, connected to said input terminal, for detecting phase voltage of one of said phase windings and generating a rotation signal if it detects said phase voltage;
a main power circuit, connected to said sub-power circuit, for supplying power;

a field current switching element connected to said field coil;

a voltage control circuit, connected to said main power circuit, for monitoring the output voltage of said full-wave rectifier and generating a control signal that controls said field current switching element so that said output voltage of said full-wave rectifier can be controlled at a prescribed level; wherein

said sub-power circuit comprises a comparator having a first input terminal connected to said input terminal and a second input terminal, and means, connected to said second input

terminal, for providing a variable threshold level varying with said phase voltage.

14. A voltage regulator of a vehicle AC generator including a rotor having a field coil and a plurality of magnetic poles, an armature having a plurality of phase windings and a full-wave rectifier connected to said phase windings, said voltage regulator comprising:

a phase-voltage-input terminal connected to one of said phase windings;

a phase-voltage-detection circuit, connected to said phase voltage input terminal, for detecting phase voltage of said one of said phase windings and generating a rotation signal if it detects said phase voltage;

a field current switching element connected to said field coil;

a voltage control circuit for monitoring the output voltage of said full-wave rectifier and generating a control signal that controls said field current switching element so that said output voltage of said full-wave rectifier can be controlled at a prescribed level; wherein

said phase-voltage-detection circuit comprises a comparator having a first input terminal connected to said phase-voltage-input terminal and a second input terminal, and a threshold circuit, connected to said second input terminal, for providing a variable threshold level varying with said phase voltage.

15. The voltage regulator as claimed in claim 14, wherein said phase-voltage-detection circuit comprises an integration circuit having an output terminal connected to said first input terminal, for providing a mean value of said phase voltage.

16. The voltage regulator as claimed in claim 14, wherein said phase-voltage-detection circuit comprises a peak hold circuit having an output terminal connected to said second input terminal of said comparator, for detecting peak values of said one of phase voltage.

17. The voltage regulator as claimed in claim 15, wherein said phase-voltage-detection circuit further comprises a second comparator having a first input terminal connected to said phase-voltage-input terminal and a timer circuit 82 connected in series with said second comparator for providing a certain interval before a next phase voltage.

18. The voltage regulator as claimed in claim 17, wherein said phase-voltage-detection circuit further comprises a second resistor, a switching element connected in series with said second resistor, a third comparator having a first input terminal connected to said phase-voltage-input terminal for controlling said switching element.